CLAIMS

1. A structure comprising a substrate bearing, on at least part of its surface, a photocatalytic antisoiling layer based on titanium dioxide (TiO_2), characterized in that said photocatalytic layer is coated with a thin nonporous layer, containing silicon and oxygen and having a covering power, capable of mechanically and chemically protecting the underlying photocatalytic layer, while maintaining the photocatalytic activity of the TiO_2.

2. The structure as claimed in claim 1, characterized in that said thin layer containing silicon and oxygen is present in the form of a continuous film.

3. The structure as claimed in either of claims 1 and 2, characterized in that said thin layer containing silicon and oxygen is present in the form of a film that conforms to the surface asperities of the underlying photocatalytic layer.

4. The structure as claimed in one of claims 1 to 3, characterized in that the thin layer containing silicon and oxygen is a layer of at least one silicon-oxygen compound chosen from SiO_2, SiOC, SiON, SiO_x, where $x<2$, and SiOCH.

5. The structure as claimed in one of claims 1 to 4, characterized in that the thin layer containing silicon and oxygen is a layer of at least one silicon-oxygen compound with which at least one compound chosen from Al_2O_3 and ZrO_2 is associated.

6. The structure as claimed in claim 5, characterized in that the (Al and/or Zr)/Si atomic ratio does not exceed 1.

7. The structure as claimed in either of claims 5 and 6, characterized in that the Al/Si ratio is between 0.03 and 0.5, in particular between 0.05 and 0.1.

8. The structure as claimed in one of claims 5 to 7, characterized in that the Zr/Si ratio is between 0.05 and 0.4.

9. The structure as claimed in one of claims 1 to 8, characterized in that the thin layer containing silicon and oxygen has a thickness of at most 15 nm, especially at most 10 nm and in particular at most 8 nm, being preferably at most 5 nm, or about 5 nm, in particular 2 to 3 nm.

10. The structure as claimed in one of claims 1 to 9, characterized in that the titanium dioxide-based layer consists of TiO_2 alone or of TiO_2 doped with at least one dopant chosen especially from: N; pentavalent cations such as Nb, Ta and V; Fe; and Zr.

11. The structure as claimed in one of claims 1 to 10, characterized in that the TiO_2-based layer has been deposited by a sol-gel method or by a pyrolysis, especially chemical vapor deposition, method or by room-temperature vacuum sputtering, where appropriate magnetron and/or ion-beam sputtering, using a metal or TiO_x target, where $x<2$, and in an oxidizing atmosphere, or using a TiO_2 target in an inert atmosphere, the TiO_2 produced by the sputtering then having possibly being subjected to a heat treatment so as to be in the crystallized state in a photocatalytically active form.

12. The structure as claimed in one of claims 1 to 11, characterized in that the thin layer containing silicon

and oxygen has been deposited by room-temperature vacuum sputtering, where appropriate magnetron and/or ion-beam sputtering, using a target of Al (8 at%)-doped Si in an Ar/O_2 atmosphere at a pressure of 0.2 Pa.

13. The structure as claimed in one of claims 1 to 12, characterized in that it includes, immediately below the TiO_2-based layer, an underlayer having a crystallographic structure for assisting in the crystallization, by heteroepitaxial growth, in the anatase form of the TiO_2-based upper layer, especially an underlayer consisting of $ATiO_3$ where A denotes barium or strontium.

14. The structure as claimed in one of claims 1 to 13, characterized in that the substrate consists of a sheet, whether plane or having curved faces, of monolithic or laminated glass, glass-ceramic or a hard thermoplastic, such as polycarbonate, or else of glass or glass-ceramic fibers, said sheets or said fibers having, where appropriate, received at least one other functional layer before application of the TiO_2-based layer or of a layer for assisting in the crystallization of the latter by heteroepitaxial growth.

15. The structure as claimed in claim 14, characterized in that the functional layer or the other functional layers are chosen from layers having an optical functionality, thermal control layers and conducting layers, and also, if the substrate is made of glass or glass-ceramic, layers acting as a barrier to the migration of alkali metals from the glass or from the glass-ceramic.

16. A process for manufacturing a structure as defined in one of claims 1 to 15, characterized in that an optionally doped TiO_2 layer is deposited on a substrate made of glass or glass-ceramic or polycarbonate-type

hard plastic, of the sheet type, or on glass or glass-ceramic fibers, said optionally doped TiO_2 layer being subjected to a heat treatment in order to give it a photocatalytic property if this is not provided by the conditions used for depositing it, and then a thin layer containing silicon and oxygen as defined in one of claims 1 to 9 is deposited on said photocatalytic layer.

17. The process as claimed in claim 16, characterized in that the deposition of a TiO_2 layer and that of the thin layer containing silicon and oxygen are carried out in succession at room temperature, by vacuum sputtering, where appropriate magnetron and/or ion-beam sputtering, in the same chamber, the conditions being the following:

- for depositing the TiO_2-based layer, supply in AC or DC mode, at a pressure of 1-3 mbar and in an oxygen/inert gas (argon) atmosphere, using a Ti or TiO_x target, where x = 1.5 to 2; and
- for depositing the layer containing silicon and oxygen, supply in AC mode at a pressure of 0.1 to 1.0 Pa and in an Ar/O_2 atmosphere using a target having a high silicon content,

the deposition of the TiO_2 layer being optionally preceded by the deposition of an underlayer for assisting in the crystallization by epitaxial growth in the anatase form of the TiO_2 layer.

18. The process as claimed in either of claims 16 and 17, in which the coating of a glass or glass-ceramic substrate is carried out, characterized in that, before application of the TiO_2 layer or of the underlayer associated therewith, at least one layer forming a barrier to the migration of alkali metals present in the glass or glass-ceramic is deposited on the substrate, an annealing or toughening operation then possibly being carried out, after the TiO_2 layer and the thin silicon-based layer covering the latter have been

deposited, at a temperature of between 250°C and 550°C, preferably between 350°C and 500°C, in the case of the annealing operation and at a temperature of at least 600°C in the case of the toughening operation.

19. The process as claimed in one of claims 16 to 18, characterized in that, after the optional application of at least one layer forming a barrier to the migration of alkali metals and before application of the TiO_2 layer or the underlayer associated with the latter, at least one functional layer chosen from layers having an optical functionality, thermal control layers and conducting layers is deposited, said functional layers being advantageously deposited by vacuum sputtering, where appropriate magnetron and/or ion-beam sputtering.

20. Single or multiple glazing, in particular for motor vehicles or buildings, comprising, on at least one face respectively, a structure as defined in one of claims 1 to 15, said face being especially that facing the outside, or possibly also that facing the inside.